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PATENT APPLICATION
Attorney's Docket No.:3058.1000-023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Vincent Palermo, Patrick J. Cobler and Neal R. Butler

Title: Diversity Circuit for Magnetic Communication System

Reissue Application of U.S. Patent No. 5,912,925

Date: 6/14/01	Express Mail No. EL552571815US

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Please amend the application as follows:

In the Specification, Please Rewrite the Paragraph Starting at Column 7 Line 11 as follows:

The phase adjustment information used in receiving signals can also be used in driving transmission signals to provide a maximum signal level at the receiver location. Since the phases of the incoming signals are adjusted to achieve a maximum signal level, the phase adjustments define the position and orientation of the transmitting coil. The same phase adjustments on transmission compensate for this position and orientation. Thus, a single reception coil can be used. According to an embodiment of the invention, the base unit 1 includes three orthogonally positioned coil transducers with phase adjusting circuitry for both reception and transmission. The portable device, therefore, only requires a single coil transducer and can be made smaller in size. As illustrated in FIG. 6, the phase shifters output a phase

adjustment to modulator circuits 123 for driving transmission signals. The modulator circuits 123 are shown more fully in FIG. 8. A signal to be transmitted is split and inputted into three mixers 227, 228, 229. Three phase shifters 230, 231, 232 receive a carrier signal and a respective phase adjustment. The phase adjustments are received from the phase shifters 120, 121, 122 in the reception circuitry. The phase shifters provide the phase adjusted carrier signal to the mixers [multiplexers] 227, 228, 229, where they are multiplied by the signal to be transmitted. The resulting multiplied signals are passed to respective drivers 224, 225, 226 for the three coil transducers 102, 103, 104 for the base unit 1. When the transmitted signal is phase shifted on each of the three coil transducers, the outputs are summed magnetically in transmission to provide a maximum signal at the receiving coil 101.

In the Claims

Please add Claims 8-98.

8. A method for communicating, the method comprising the steps of:

receiving an inductive input signal on each of multiple uniquely oriented receivers;

generating an electronic signal corresponding to the received inductive input signal for each of the receivers;

adjusting a phase of at least one of the electronic signals to substantially align the electronic signals with each other; and

summing the aligned electronic signals to produce an output signal that corresponds to the inductive input signal.

9. A method as in claim 8 further comprising:

multiplexing each of the electronic signals to an error amplifier circuit and generating corresponding phase adjustment signals to align the electronic signals.

10. A method as in claim 9 further comprising:

maintaining a phase adjustment of at least one electronic signal during which another electronic signal is monitored for generating a corresponding phase adjustment signal.

11. A method as in claim 8, wherein the receivers include inductive transducer devices.

12. A method as in claim 8 further comprising:

adjusting a polarity of one or more of the electronic signals so that the electronic signals have the same sign and sum to produce a larger output signal.

13. A method as in claim 12, wherein a polarity of an electronic signal corresponding to the inductive input signal is changed by phase shifting.

14. A method as in claim 8, wherein the inductive input signal includes information modulated on a carrier frequency signal.

15. A method as in claim 8, wherein the uniquely oriented receivers are orthogonally disposed to each other.

16. A method as in claim 8 further comprising:

comparing a phase of each of the electronic signals with a common reference signal; and

controlling a local oscillator in a corresponding phase shifter to align the phase of each electronic signal with the reference signal.

17. A method as in claim 8 further comprising:

generating an error signal that is used to adjust a phase of at least one electronic signal relative to a reference signal.

18. A method as in claim 8 further comprising:

adjusting a phase of the electronic signals to compensate for a relative motion of the receivers with respect to the inductive input signal.

19. A method as in claim 18, wherein the phase of the electronic signals are adjusted at a fast enough rate to account for the relative motion of the receivers.

20. A method for communicating, the method comprising the steps of:

orienting each of multiple transmitter devices along a unique axis to generate a magnetic field;

identifying a target receiver to which the magnetic field is transmitted; and

adjusting a phase output of the multiple transmitter devices to produce the magnetic field for the target receiver.

21. A method as in claim 20, wherein the magnetic field is generated from three orthogonally disposed transmitter devices.

22. A method as in claim 20 further comprising:

receiving the magnetic field on a single reception coil at the target receiver.

23. A method as in claim 22, wherein the single reception coil is disposed in a portable device.

24. A method as in claim 20 further comprising:

generating an electronic signal of information to be transmitted to the target receiver; and

multiplying the electronic signal with corresponding phase adjusted carrier frequencies to produce modulated signals and driving the transmitter devices with the modulated signals to produce the magnetic field.

25. A method as in claim 20 further comprising:

disposing the multiple transmitter devices in a portable device.

26. A method as in claim 25 further comprising:

coupling the portable device to a communications network.

27. A method for communicating, the method comprising the steps of:

receiving an inductive input signal on each of multiple uniquely oriented receivers, the inductive input signal being received from a remote source;

generating an electronic signal from each of the receivers, each electronic signal corresponding to the inductive input signal;

based on a phase difference of the electronic signals, adjusting a phase of multiple transmitters to produce an inductive output signal that is transmitted to a target receiver near the remote source.

28. A method as in claim 27, wherein the multiple transmitters are aligned along similar axes as the uniquely oriented receivers.

29. A method as in claim 28, wherein the uniquely oriented receivers and transmitters utilize a common set of transducers to transmit and receive corresponding inductive signals.

30. A method as in claim 27, wherein the target receiver near the remote source is oriented along a same axis as the remote source.

31. A method as in claim 27, wherein the target receiver near the remote source includes a single transducer that is used to both transmit and receive corresponding inductive signals.

32. A method as in claim 27, wherein the inductive output signal is transmitted to a portable device.

33. A method as in claim 32, wherein the portable device is coupled to a communications network.

34. A method as in claim 27, wherein the receivers include three orthogonally positioned transducers.

35. A method as in claim 27, wherein the inductive input signal is received from a portable headset.

36. A method as in claim 27 further comprising:

multiplexing each of the electronic signals to an error amplifier circuit and generating corresponding phase adjustment signals to align the electronic signals; and

utilizing the phase adjustment signals to produce the inductive output signal.

37. A method as in claim 36 further comprising:

maintaining a phase adjustment of at least one transmitter during which another electronic signal is monitored for generating a corresponding phase adjustment signal for another transmitter.

38. A method as in claim 27, wherein the inductive output signal includes information modulated on a carrier frequency signal.

39. A method as in claim 27, wherein the uniquely oriented receivers are orthogonally disposed to each other.

40. A method as in claim 27 further comprising:

comparing a phase of each of the electronic signals with a common reference signal; and

controlling a local oscillator in a corresponding phase shifter to adjust the phase of each transmitter with respect to the reference signal.

41. A method as in claim 27 further comprising:

adjusting a phase of at least one transmitter device to compensate for a relative motion of the receivers with respect to the inductive input signal.

42. A method for communicating, the method comprising the steps of:

receiving an inductive input signal on each of multiple uniquely oriented receivers, the inductive input signal being generated from a remote source;

producing an electronic signal that corresponds to the inductive input signal for each of the receivers, a level of each electronic signal being proportional to a strength of the received inductive input signal at a corresponding receiver;

detecting which receiver produces a strongest electronic signal based upon a reception of the inductive input signal;

generating an inductive output signal from a transmitter oriented along a similar axis as the receiver that produces the strongest electronic signal.

43. A method as in claim 42, wherein the transmitter from which the inductive output signal is generated is one of multiple uniquely oriented transmitters.

44. A method as in claim 43, wherein the uniquely oriented transmitters are aligned along similar axes as the uniquely oriented receivers.

45. A method as in claim 44, wherein the receivers and transmitters utilize a common set of transducers to transmit and receive corresponding inductive signals.

46. A method as in claim 42 further comprising:

comparing an amplitude of the electronic signals to determine which of the multiple uniquely oriented receivers receives the strongest electronic signal.

47. A method as in claim 42, wherein the inductive output signal is transmitted to a receiver near the remote source.

48. A method as in claim 47, wherein the receiver near the remote source is oriented along a similar axis as the remote source.

49. A method as in claim 48, wherein the receiver at the remote source includes a single transducer that is used to both transmit and receive corresponding inductive signals.

50. A method as in claim 43 further comprising:

detecting which of the multiple receivers produces a strongest set of electronic signals; and

generating an inductive output signal from transmitters oriented on similar axes as the receivers that generate the strongest set of electronic signals.

51. A method as in claim 50 further comprising:

adjusting at least one phase output of the transmitters generating the inductive output signal for maximal reception at a receiver located near the remote source.

52. A method as in claim 42, wherein the inductive output signal is transmitted to a portable device.

53. A method as in claim 52, wherein the portable device is coupled to a communications network.

54. A system for communicating, the system comprising:

multiple uniquely oriented receivers that each receive an inductive input signal;

electronic circuits that generate an electronic signal corresponding to the received inductive input signal for each of the receivers;

phase shifter circuits that adjust a phase of at least one of the electronic signals to substantially align the electronic signals with each other; and

a summer circuit that sums the aligned electronic signals to produce an output signal that corresponds to the inductive input signal.

55. A system as in claim 54 further comprising:

a multiplexor circuit that multiplexes each of the electronic signals to an error amplifier circuit which generates corresponding phase adjustment signals to align the electronic signals.

56. A system as in claim 55, wherein at least one phase shifter circuit maintains a phase adjustment of an electronic signal during which another electronic signal is monitored for generating a corresponding phase adjustment signal for another phase shifter.

57. A system as in claim 54, wherein the receivers include inductive transducer devices.

58. A system as in claim 54, wherein a polarity of one or more of the electronic signals is adjusted via the phase shifter

circuits so that all electronic signals have the same sign and are summed to produce the output signal.

59. A system as in claim 58, wherein a polarity of an electronic signal corresponding to the inductive input signal is changed by phase shifting.

60. A system as in claim 54, wherein the inductive input signal includes information modulated on a carrier frequency signal.

61. A system as in claim 54, wherein the multiple uniquely oriented receivers are orthogonally disposed to each other.

62. A system as in claim 54 further comprising:

a comparator circuit that compares a phase of each of the electronic signals with a common reference signal; and

a controller circuit that controls a local oscillator in a corresponding phase shifter to align the phase of each electronic signal with the reference signal.

63. A system as in claim 54 further comprising:

a monitor circuit to generate an error signal that is used to adjust a phase of at least one electronic signal relative to a reference signal.

64. A system as in claim 54, wherein phases of the electronic signals are adjusted to compensate for a relative motion of the receivers with respect to the inductive input signal.

65. A system for communicating, the system comprising:

multiple transmitter devices, each of which is oriented along a unique axis to generate a magnetic field;

a target receiver to which the magnetic field is transmitted; and

phase shifter circuits that adjust phase outputs of the multiple transmitter devices to produce the magnetic field for the target receiver.

66. A system as in claim 65, wherein the magnetic field is generated from three orthogonally disposed transmitter devices.

67. A system as in claim 65 further comprising:

a single reception coil at the target receiver that receives the magnetic field.

68. A system as in claim 67, wherein the single reception coil is disposed in a portable device.

69. A system as in claim 65 further comprising:

processing electronics that generates an electronic signal of information to be transmitted to the target receiver; and

mixer circuits that multiply the electronic signal with corresponding phase adjusted carrier frequencies to produce modulated signals; and

drivers that drive the transmitter devices with the modulated signals to produce the magnetic field.

70. A system as in claim 65, wherein the multiple transmitter devices are disposed in a portable electronic device.

71. A system as in claim 70, wherein the portable electronic device is coupled to a communications network.

72. A system for communicating, the system comprising the steps of:

multiple uniquely oriented receivers, each of which receives an inductive input signal from a remote source;

an electronic circuit that generates an electronic signal for each of the receivers, each electronic signal corresponding to the inductive input signal;

phase shifters that adjust a phase of multiple transmitters based on a phase difference of the electronic signals, the transmitters producing an inductive output signal to a target receiver near the remote source.

73. A system as in claim 72, wherein the multiple transmitters are aligned along similar axes as the uniquely oriented receivers.

74. A system as in claim 73, wherein the uniquely oriented receivers and transmitters utilize a common set of transducers to transmit and receive corresponding inductive signals.

75. A system as in claim 72, wherein the target receiver near the remote source is oriented along a similar axis as the remote source.

76. A system as in claim 72, wherein the target receiver near the remote source includes a single transducer that is used to both transmit and receive corresponding inductive signals.

77. A system as in claim 72, wherein the inductive output signal is transmitted to a portable device.

78. A system as in claim 77, wherein the portable device is coupled to a communications network.

79. A system as in claim 72, wherein the receivers are three orthogonally positioned transducers.

80. A system as in claim 72, wherein the transmitter from which the inductive output signal is generated is one of multiple uniquely oriented transmitters.

81. A system as in claim 72 further comprising:

a multiplexor circuit that multiplexes each of the electronic signals to an error amplifier circuit which generates corresponding phase adjustment signals to align the electronic signals, the phase adjustment signals being utilized to produce the inductive output signal.

82. A system as in claim 81, wherein a phase shifter maintains a phase adjustment of at least one transmitter during which another electronic signal is monitored for generating a corresponding phase adjustment signal for another transmitter.

83. A system as in claim 72, wherein the inductive output signal includes information modulated on a carrier frequency signal.

84. A system as in claim 72, wherein the uniquely oriented receivers are orthogonally disposed to each other.

85. A system as in claim 72 further comprising:

a comparator circuit that compares a phase of each of the electronic signals with a common reference signal; and

a controller circuit that controls a local oscillator in a corresponding phase shifter to adjust the phase of each transmitter with respect to the reference signal.

86. A system as in claim 72, wherein the phase of at least one transmitter device is adjusted to compensate for a relative motion of the receivers with respect to the inductive input signal.

87. A system for communicating, the system comprising:

multiple uniquely oriented receivers, each of which receives an inductive input signal, the inductive input signal being generated from a remote source;

a circuit coupled to the receivers that produces an electronic signal corresponding to the inductive input signal for each of the receivers, a level of each electronic signal being proportional to a strength of the received inductive input signal at a corresponding receiver;

a comparator circuit that detects which receiver produces a strongest electronic signal based upon a reception of the inductive input signal;

a driver circuit that generates an inductive output signal from a transmitter oriented along a similar axis as the receiver that produces the strongest electronic signal.

88. A system as in claim 87, wherein the transmitter from which the inductive output signal is generated is one of multiple uniquely oriented transmitters.

89. A system as in claim 88, wherein the uniquely oriented transmitters are aligned along similar axes as the uniquely oriented receivers.

90. A system as in claim 89, wherein the receivers and transmitters utilize a common set of transducers to transmit and receive corresponding inductive signals.

91. A system as in claim 87, wherein the comparator circuit compares an amplitude of each of the electronic signals to determine which of multiple uniquely oriented transmitters will generate the inductive output signal.

92. A system as in claim 91, wherein the inductive output signal is transmitted to a receiver near the remote source.

93. A system as in claim 91, wherein the receiver near the remote source is oriented along a similar axis as the remote source.

94. A system as in claim 93, wherein the receiver at the remote source includes a single transducer that is used to both transmit and receive corresponding inductive signals.

95. A system as in claim 88 further comprising:

a comparator circuit that detects which of the multiple receivers produces a strongest set of electronic signals; and

driver circuits to generate an inductive output signal from transmitters oriented on similar axes as the receivers that generate the strongest set of electronic signals.

96. A system as in claim 95, wherein at least one phase output of the transmitters is adjusted to generate the inductive output signal for maximal reception at a receiver located near the remote source.

97. A system as in claim 87, wherein the inductive output signal is transmitted to a portable device.

98. A system as in claim 97, wherein the portable device is coupled to a communications network.

REMARKS

Claims 1-98 are pending in the present reissue application. Claims 1-7 were previously allowed and are not being amended by way of this preliminary amendment. Claims 8-98 are new claims being submitted for examination in this reissue application. Support for the new claims can be found in the accompanying document entitled STATEMENT OF STATUS AND SUPPORT FOR ALL CLAIMS.

The specification is being amended to correct minor self-evident errors. No new matter is being added by way of this amendment.

It is believed that original patent U.S. Patent 5,912,925 is wholly or partly inoperative or invalid because the patentee claimed less than he had a right to claim in the patent. Hence, this is a broadening reissue application in view of newly added claims 8-98.

CONCLUSION

It is submitted that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned Attorney at (781) 861-6240.

Respectfully submitted,

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Dated:
June 14, 2001

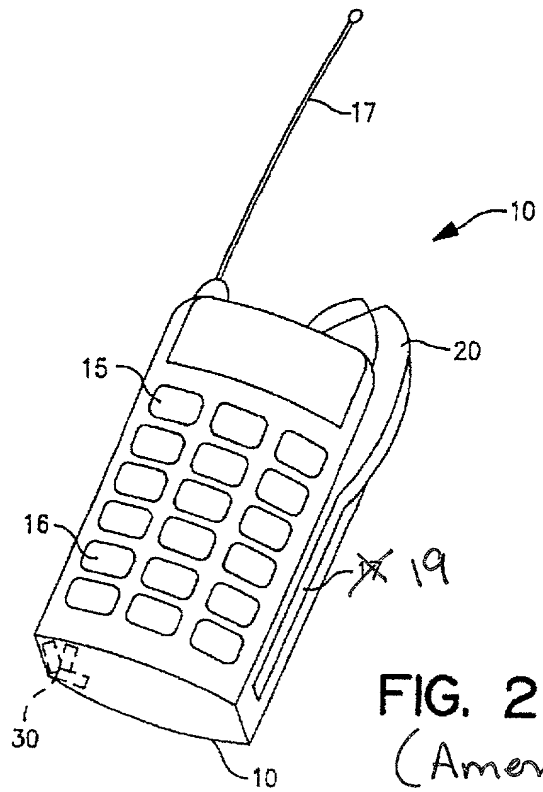


FIG. 2
(Amended)

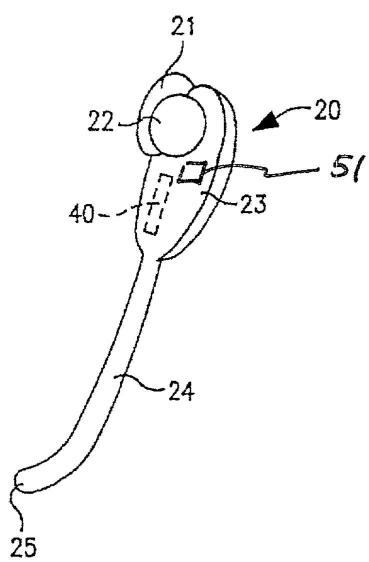
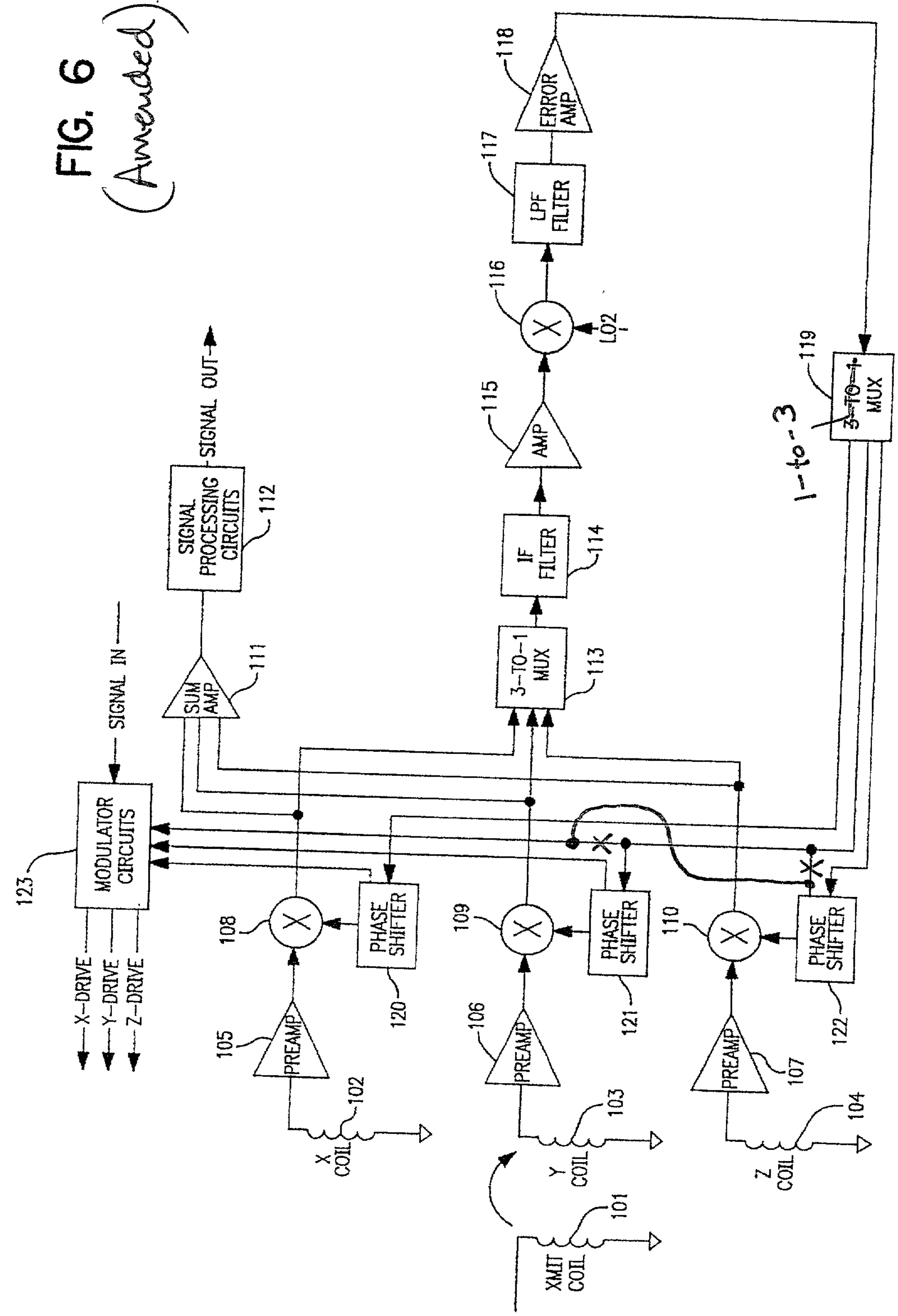


FIG. 3
(Amended)

FIG. 6
(Amended)



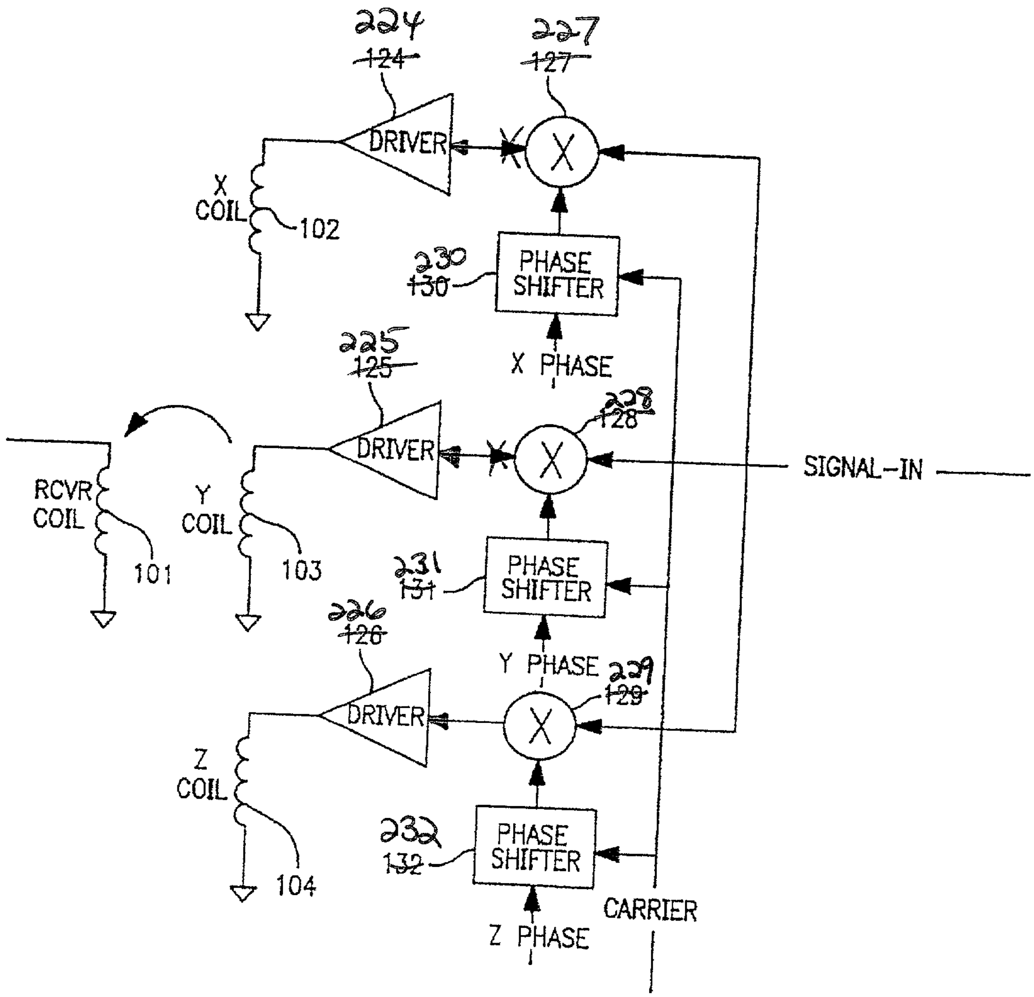


FIG. 8

(Amended)

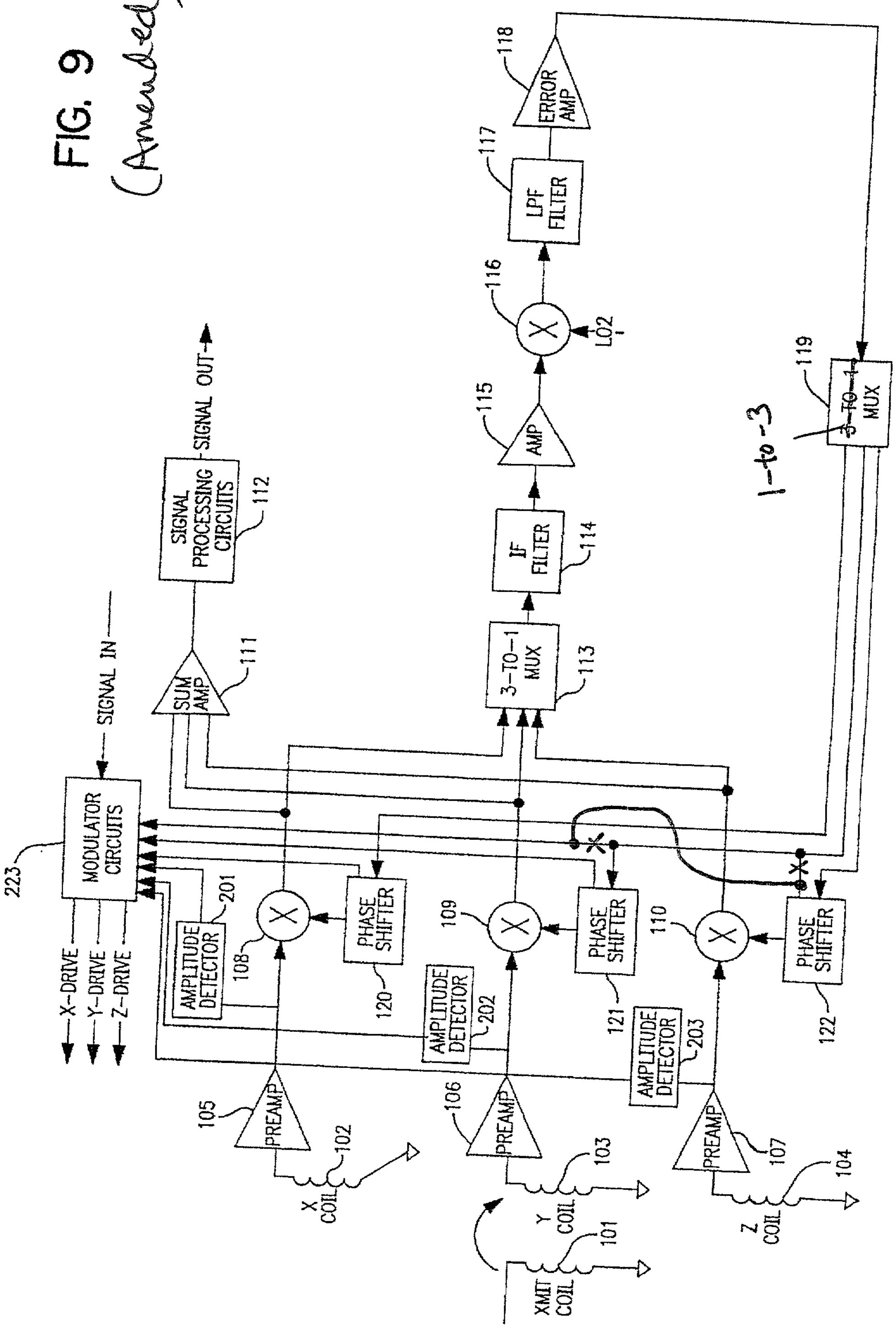


FIG. 9
(Amended)

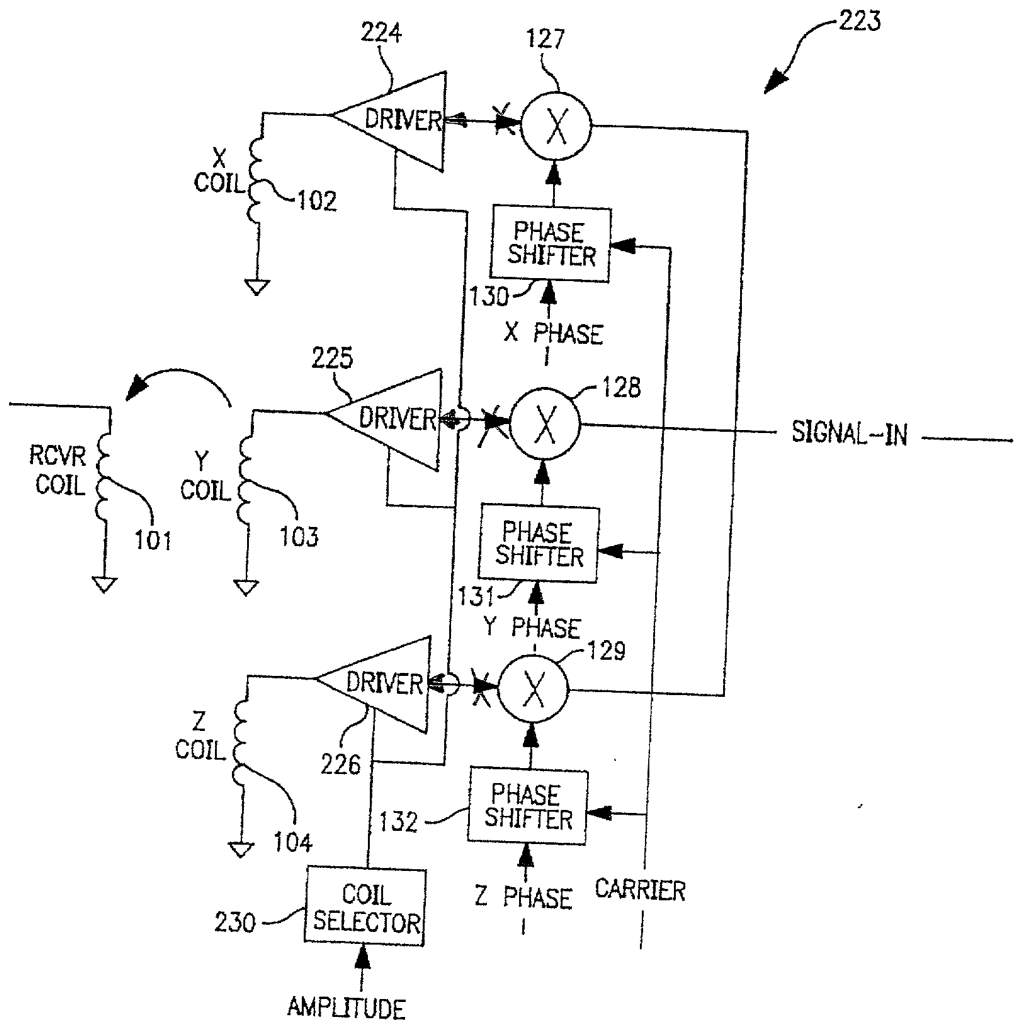


FIG. 10

(Amended)